NORTHCENTRAL UNIVERSITY
ASSIGNMENT COVER SHEET

Student: **Michael Higley-Vance**

THIS FORM MUST BE COMPLETELY FILLED IN

Follow these procedures: If requested by your instructor, please include an assignment cover sheet. This will become the first page of your assignment. In addition, your assignment header should include your last name, first initial, course code, dash, and assignment number. This should be left justified, with the page number right justified. For example:

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Save a copy of your assignments: You may need to re-submit an assignment at your instructor's request. Make sure you save your files in accessible location.

Academic integrity: All work submitted in each course must be your own original work. This includes all assignments, exams, term papers, and other projects required by your instructor. Knowingly submitting another person's work as your own, without properly citing the source of the work, is considered plagiarism. This will result in an unsatisfactory grade for the work submitted or for the entire course. It may also result in academic dismissal from the University.

EDU7003-8 **Dr. Rebecca Watts**

Statistics **Activity #1: Variables and Distributions**

Comments:

Faculty Use Only

<Faculty comments here>

<Faculty Name> <Grade Earned> <Writing Score> <Date Graded>

Michael, your work on this assignment is very good. You are explaining your answers very thoroughly and very clearly. You are understanding the concepts and applying them in answering your questions. You understand the difference in a population and sample and you also understand the difference in a parameter and sample. You are identifying the correct levels of

measurement. You are using the formula for solving specific problems correctly and your calculations are accurate. You are converting decimals to percentages by moving the decimal to the right two places. There are a couple of corrections that I made in your answers. Review those and let me know if you have questions.

Date File 1

Chapter One

1) Determine whether the evaluated group is a population or a sample.

Population – complete set of people or things (Bennett, Briggs, & Triola, 2013).
Sample – subset from which data is obtained (Bennett, Briggs, & Triola, 2013).

a) Based on a randomly selected group of 500 patients with high cholesterol, it was found that 67% have heart disease. Is this a population or a sample; explain your answer. Randomly selecting 500 patients who have an established high cholesterol rate is considered a sample or subset of the population. Population constitutes an entire set of people being studied, not a specific selection of people. good

b) An investigation of 150 randomly selected local restaurants concluded that 42% of local restaurants have serious health code violations. Is this a population or a sample; explain your answer. Randomly selecting 150 local restaurants constitutes a sample. Populations in a statistical study should include the entire population. good

2) Determine whether the given value is a statistic or a parameter.

Statistics – a collection, organization, and interpretation of data. Statistics are data, numbers, or pieces of information that describe or summarize something (Bennett, Briggs, & Triola, 2013).

Parameter – any specific characteristic of a population (Bennett, Briggs, & Triola, 2013).

a) A researcher determines that 42.7% of all downtown office buildings have ventilation problems. Is this a statistic or a parameter; explain your answer. This statement is a parameter because it considers specific characteristics of an entire population. Since this assumes the researcher studied the entire population, or all, of the downtown office buildings and found a particular percentage had a ventilation problem, then this information is a parameter. Very good reasoning.

b) After taking the first exam, 15 of the students dropped the class. Is this a statistic or a parameter; explain your answer. Since the entire class population is not revealed in the study this would be a statistic. The information provided summarizes the result found of 15 students dropping the class. We do not know, however, why the students dropped the class. Students who dropped the class could have done so because of the first exam scores, but it could also have been a result of other variables, such as the cost or timing of the class.

11/21/13 11:25 AM
Comment [1]: 15 students in a single class --- thus, the reference is to an entire population and is therefore a population.

3) Identify the type of sampling used.

Census – is the collection of data from every member of a population (Bennett, Briggs, & Triola, 2013).

Representative sample – is a sample in which the relevant characteristics of the sample members are generally the same as the characteristics of the population (Bennett, Briggs, & Triola, 2013).

Sampling methods – random sample, simple random sampling, systematic sampling, convenience sample, stratified sampling, and cluster sampling (Bennett, Briggs, & Triola, 2013).

a) A tax auditor selects every 1000th income tax return that is received. What type of sample is this and why? This is a systematic sampling method because the auditor chose every 1000th income tax return that was received. Since every submitted tax return has an equal chance of being selected, this should give the auditor a representative sample due to the fact tax returns are very similar in nature. good

b) The name of each contestant is written on a separate card, and the cards are placed in a bag with three names being picked from the bag. What type of sample is this and why? This is a simple random sampling method because the sample is chosen in such a way that each contestant are given an equal chance of being selected as long as each contestant's name is in the bag only once. good

4) Is the study experimental or observation and why?

Observational study – observes or measures the characteristics of the subjects (Bennett, Briggs, & Triola, 2013).

Experimental study – applies some treatment and observes the effects on the subjects (Bennett, Briggs, & Triola, 2013).

a) A political pollster reports that his candidate has a 10% lead in the polls with 10% undecided. This study is an observational study because the political pollster reports on the specific characteristics of his candidate that he observes or measures.

5) Select the study that is most appropriate and EXPLAIN WHY it is most appropriate for the study.

Observational studies look at past data or future data over a long period of time (Bennett, Briggs, & Triola, 2013).

Double blind study is if neither the participant nor the experimenter knows who belongs to the treatment group or who belongs in the control groups (Bennett, Briggs, & Triola, 2013).

The experimental procedure somehow influences the subjects (Bennett, Briggs, & Triola, 2013).

Case control or retrospective use data from the past (Bennett, Briggs, & Triola, 2013).

a) Is the aspirin produced by a particular pharmaceutical company better than that of a competitor at relieving headaches? Which of the following would best be used to study this: 1) a case-controlled observation; 2) an observation; 3) a double-blind experimental procedure; and 4) and experimental procedure. The most appropriate is the double-blind study because neither the participant nor the experimenter would know who belongs to the treatment group or control group. If one group were given an aspirin produced by a particular pharmaceutical company and another by its competitor the study would be fair and reasonable. Good and this process would reduce potential bias

From Chapter One

1) Focus on Public Health—On page 44 of the text, it discusses the Harvard Nurses' Health Study, which is a very well-known study that has been conducted for a number of years.

Answer discussion question number two at the end of the article: **Explain why the Harvard Nurses' Health Study is an observational study. Critics sometimes say that the results would be more valid if obtained by experiments rather than observations. Discuss whether it would be possible to gather similar data by carrying out experiments in a practical and ethical way.**

An observational study observes or measures specific characteristics while trying not to influence or modify the characteristics that the study is observing. The purpose of an experiment is to study the effects of some treatment (Bennett, Briggs, & Triola, 2013, p. 19). The professor of this study analyzes the long-term effects of an oral contraceptive by mailing questionnaires to approximately 370,000 registered nurses. The professor believed the nurse's responses would be more reliable due to their medical training than the general public.

It may be possible to gather additional and more reliable information conducting alternative experiments. Actual testing of selected or randomly selected participants may present more accurate data. However, this type of study is very expensive and time consuming. The critics could be accurate as it pertains to the data. Whereas, a survey may be more cost effective depending on the experimenter's allotted budget for the study (Bennett, Briggs, & Triola, 2013). good

Chapter Two

1) Identify the following variables as either qualitative or quantitative and EXPLAIN your answers.

Qualitative consists of values that can be placed in non-numerical categories (Bennett, Briggs, & Triola, 2013).

Quantitative are values that represent counts or measurements (Bennett, Briggs, & Triola, 2013).

a. The number of people on a jury. The number of people on a jury is quantitative because they can be physically counted and represented as a number. good

b. The color of your house. The color of your house is qualitative because colors can be placed into categories. Colors are not represented as numbers that can be summed or averaged. good

2) Identify the number as either continuous or discrete and EXPLAIN your answers.

Continuous data can take on any value in a given interval (Bennett, Briggs, & Triola, 2013).

Discrete data can take on only particular, distinct values, and no other values in between (Bennett, Briggs, & Triola, 2013).

a. The average height of all freshmen entering college in a certain year is 68.4 inches. This is continuous due to the height of freshman entering college each year will vary. The data can take on values that are fractions or decimals as it is represented in this case. good

b. The number of limbs on a 2-year-old oak tree is 21. This data is discrete because the number of limbs was counted and has distinct values with no other values in between. good

3) Determine which of the four levels of measurement is most appropriate and explain your answer.

The four levels of measurement are: nominal, ordinal, interval, and ratio (Bennett, Briggs, & Triola, 2013).

a. Temperatures in degrees Fahrenheit of the ocean at various depths. This is interval. Fahrenheit temperatures are at the interval level of measurement. good

b. The rank of individuals in the military. This is ordinal; qualitative data that can be arranged in some order. Rank has order and chain of command. good

c. The number of people with blue, brown and red hair in a classroom. This is nominal. The number of people with blue, brown, or red hair in a classroom is quantitative, which can then be represented as a number of people with blue, brown, or red hair. This one is tricky; you are recording the actual number of individuals who have the different colored hair and thus the measurement would be a ratio measurement.

4) Determine the following (show your work):

a. The speed of a new microprocessor is 800MHZ, but a new test of its speed gives a measurement of 820MHZ. What is the absolute error? What is the relative error?

The absolute error for any given data uses the formula, claimed or measured value minus the true value (Bennett, Briggs, & Triola, 2013).

In the case of testing the speed of a microprocessor, the finding was 820 MHz in a new test after claiming the microprocessor speed was 800 MHz. The absolute error would be computed in this manner: The absolute error = measured value - true value

820MHZ - 800MHZ = 20MHZ is the absolute error

Finding the relative error uses the formula, absolute error divided by the true value multiplied by 100%. The relative error for this case would be computed in this manner: The relative error = absolute error / true value * 100%

20MHZ / 800MHZ * 100% = 2.5% represents the relative error good calculations

b. Convert 1/16 to a percent. To convert a fraction to a percent, simply divide the numbers and then move the decimal point two places to the right. In this case, 1/16 would become .0625. Moving the decimal point to the right by two places, the answer would be 6.25%. good

c. Convert 0.45 to a percent. To convert a decimal number to a percent, simply move the decimal point two places to the right. In this case, 0.45 would become 45%. good

d. Humanities majors spend an average of $115 per course on books. Mathematics majors spend an average of $70 per course on books.
What is the percent difference between the two amounts relative to the amount for mathematics majors (round to the nearest percent)?

When comparing two percentages, the reference value is the percentage used as the basis for the comparison. In this case, the average amount spent by mathematics majors, $70 per book per course, is used as the reference value. The compared value is the average amount spent by humanities majors, $115 per book per course. The formula for finding the absolute difference is: Absolute Difference = Compared Value - Reference Value

115 - 70 = 45 represents the absolute difference between math majors

The relative difference is computed in this manner: Relative Difference = Compared Value – Reference Value / Reference Value * 100%

45/70 * 100% = .642857
.642857 * 100% = 64% represents the percent difference good

e. Suppose that the cost of a statistics text was $50 in 1985 and is $100 in 2000. What is the "Statistics Text Index" number, rounded to the nearest tenth, for the 2000 edition with the 1985 price as the reference value?

An index number allows the comparison of measurements taken at different times or in different places. The value at a particular time is selected as the reference, or

base, value. The formula for any other time is computed as: Index Number = Value / Reference Value * 100

In the case of the "Statistics Text Index", the cost of a statistics text in 1985 was $50 and in 2000, the cost had risen to $100.

100 / 50 = 2
2 * 100% = 200$represents the statistic text index

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From Chapter Two

2) Focus on Economics—On page 76 and 77, the article looks at an important issue to everyone—the economy. In particular it is focusing on whether our standard of living is improving.

Answer discussion question number one at the back of the article: **Find examples in your own spending or the spending of friends and family of substitution effects and the purchase of products that were unavailable or lower quality a few years ago. Overall, do you think these examples support the claim that the Consumer Price Index (CPI) overstates the effects of inflation? Defend your opinion.**

As inflation rises and a person's income level does not the standard of living will (should decrease) decrease. An example of this is when a person spends more than they can afford or have coming in. This can be purposeful spending or having unexpected expenses coming in that were not anticipated. For many families, this may occur more frequently than not. Expenses for such products as groceries, cell phones, clothes, shoes, entertainment products, personal hygiene items, and/or services are continuously rising over time. A person in this economic situation typically makes concessions and eliminates non-essential items or finds products at a lesser value or quality. This is called the price substitution effect and means that people do not recognize the cost of products increasing as much as the CPI reports (Bennett, Briggs, & Triola, 2013).

It is my observation and opinion that the CPI overstates the effects of inflation because I personally make constant spending adjustments based on the cost of products compared to various store locations and product offerings. Although I greedily enjoy "shopping smarter" while taking advantage of a cost of living increase, when available, I agree with the information presented in figure 2.5. The figure shows that using the "chained CPI" formula would help reduce the government's overall deficient by linking a more accurate CPI formula to changes in the tax rates and cost of living adjustments (Bennett, Briggs, & Triola, 2013). Good points.

References

Bennett, J., Briggs, W., & Triola, M. (2013). *Statistical reasoning for everyday life*. (4th ed.) Boston: Pearson Education, Inc.